



**Magnesium Elektron**

SERVICE & INNOVATION IN MAGNETISM

# Elektron WE43

Datasheet : 467

Magnesium Elektron Ltd.  
PO Box 75, Amersham, Bucks, MK12 4UD England  
Tel: 01494 511100 Fax: 01494 511100  
Web: [www.magnetelectron.com](http://www.magnetelectron.com) VAT No: GB 990 2342 25  
A limited liability company registered in England  
Registered office: Magnesium Elektron Ltd, Station Road, Hemel Hempstead, HX1 2J  
A Public Limited Company

ELEKTRON WE43 is a high strength magnesium based casting alloy developed and patented by Magnesium Elektron for use at temperatures up to 250°C.

This alloy system maintains its good mechanical properties at elevated temperatures, without the use of either silver or thorium. The alloy is stable for long term exposure up to 250°C.

ELEKTRON WE43 has excellent corrosion resistance characteristics.

#### APPLICATIONS

The excellent retention of properties at elevated temperatures will be of interest to designers of helicopters, transmissions, pistons, racing and high performance cars.

#### SPECIFICATIONS

UNS No. Mg42J  
ASTM B30  
AMS 4427  
NAB 4427  
AECMA MP-090302

#### CHEMICAL COMPOSITION

Yttrium	2.7-4.3%
Pure Earths	2.4-4.4%
Zirconium	0.4% min
Magnesium	Balance

#### HEAT TREATMENT

The alloy develops its optimum properties in the fully heat treated condition for

Solution heat treat for 8 hours at 625°C,

Air cool, not water or polymer quench,

Age for 16 hours at 250°C,

Air cool.

#### PHYSICAL PROPERTIES

Specific gravity	1.84
Coefficient of thermal expansion	$26.7 \times 10^{-6} \text{ K}^{-1}$
Thermal conductivity	$81.3 \text{ Wm}^{-1} \text{ K}^{-1}$
Specific heat	$699 \text{ Jkg}^{-1} \text{ K}^{-1}$
Electrical resistivity	345 nΩm
Modulus of elasticity	$44 \times 10^3 \text{ MPa}$
Poissons ratio	0.27
Working range	50-600°C
Damp high stress	0.30
Vickers hardness	85-105

#### DESIGN DATA

Minimum specification tensile properties

0.2% Proof stress	172 MPa
Tensile strength	220 MPa
Elongation	2%

#### OTHER PROPERTIES

##### CASTABILITY

Fine grained and pressure tight with good casting characteristics.

##### PATTERN MAKING DRAINAGE

Factor

1.5%

##### WELDABILITY

Fully weldable by the tungsten arc inert gas (TIG) process, using filler rods of the parent alloy composition.

##### MACHINING

ELEKTRON WE43 castings, like all magnesium alloy castings, machine faster than any other metal. Providing the geometry of the part allows, the limiting factor is the power and speed of the machine rather than the quality of the tool material. The power required per cubic centimetre of metal removed varies from 9 to 14 watts per minute depending on the operation.

##### SURFACE TREATMENT

Normal protective treatments apply for ELEKTRON WE43 but some chromating baths may need to be modified for the satisfactory treatment of castings.

Please refer to Magnesium Elektron Data Sheet 205

# AMBIENT TEMPERATURE MECHANICAL PROPERTIES

## TYPICAL TENSILE PROPERTIES

50% Proof stress	120 MPa
Tensile strength	250 MPa
Elongation	7%

## TYPICAL COMPRESSIVE PROPERTIES

50% Proof stress	127 MPa
(Bulk strength)	225 MPa

## TYPICAL SHEAR PROPERTIES

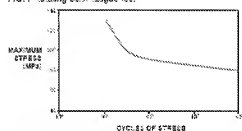
Ultimate stress	162 MPa
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## WELD TENSILE PROPERTIES

Weld	15.9 MPa m <sup>3/2</sup>
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## FATIGUE PROPERTIES

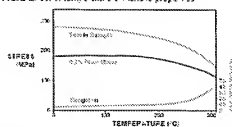
FIG. 1 Rotating beam fatigue test



# ELEVATED TEMPERATURE MECHANICAL PROPERTIES

## TYPICAL TENSILE PROPERTIES

FIG. 2 Effect of temperature on tensile properties



## CREEP PROPERTIES

FIG. 3 Stress-time relationship for specified creep strains at 220°C

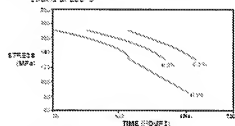
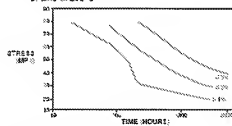
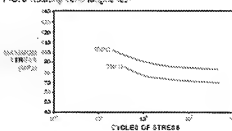


FIG. 4 Stress-time relationship for specified creep strains at 250°C



## FATIGUE PROPERTIES

FIG. 5 Rotating beam fatigue test



## Elektron WE43 Castings

OUT-OF-PROPERTIES OF SAMPLES TAKEN FROM ACTUAL CASTINGS

Temperature	Number of Tests	0.2% Proof Stress (MPa)	Tensile Strength (MPa)	Elongation (%)
20°C	216	Minimum: 149	200	3
		Average: 176	250	7
		Maximum: 215	262	10
350°C	55	Minimum: 154	187	2
		Average: 155	211	16
		Maximum: 170	235	36



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